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covered with excrescences resembling tubercles. There was no indication that the animal had adhered to any part of the shell.

The great length and size of these shells, and the division in the upper part, constitute, in Mr. Griffiths's opinion, their chief peculiarities. The radiated appearance of the substance of the shells is such, that they might, in his opinion, be easily mistaken for stalactites. Mr. Griffiths at first considered these shells as a new genus; but afterwards, on consulting the works of Rumphius, he found in that author a description of some shells, very similar, but differing by having two long-jointed tubes issuing from their upper part. These shells were found in shallow water among mangrove-trees.

*Observations on the Shell of the Sea Worm found on the Coast of Sumatra, proving it to belong to a Species of Teredo; with an Account of the Anatomy of the Teredo Navalis.* By Everard Home, Esq. F.R.S. Read May 1, 1806. [*Phil. Trans.* 1806, p. 276.]

In the first part of this paper Mr. Home relates some further particulars respecting the sea worm shell from Sumatra, of which an account was, some time since, laid before this Society by Mr. Griffiths. A specimen of one of these shells, five feet long, but imperfect at both ends, was given to Mr. Home by Capt. Maxwell; and in order to remove all doubt respecting its nature, a part of it was analysed by Mr. Hatchett, who found that it was composed of carbonate of lime and an animal gelatinous substance, greater in quantity than in the *Chama Gigas*, but less than in the common oyster.

The subsequent discovery of two boring shells and two flattened opercula, sufficiently evinced that the shell here treated of belonged to the genus *Teredo*; and as the internal structure and economy of Tereidines are very little known, our author thought that nothing would tend more to enable us to form an adequate idea respecting this new species (which he thinks may be called *Teredo gigantea*), than an accurate knowledge of the common species *Teredo Navalis*. With this view, by the assistance of Sir Joseph Banks and Mr. Whitbey, Mr. Home obtained some pieces of wood, with live Tereidines in them, from Sheerness. By means of these, and of some specimens in the British and the Hunterian Museums, he has been enabled, with the assistance of Mr. Clift and Mr. Brodie, to give a very circumstantial description, accompanied by drawings, of the anatomy of the *Teredo Navalis*.

The Tereidines brought from Sheerness, lived in salt water for the space of three days after being brought to town, during which time these animals were observed to throw out two small tubes; the largest of which was about three fourths of an inch in length, and had, within its external orifice, a fringe composed of about twenty very small tentacula. These tentacula were visible only when the tube was fully extended, because the animal drew in this tube by inverting it; whereas the smaller tube was not inverted when drawn in. The smallest of these tubes appeared to be the most sensible; for the

larger one did not always retract when touched, but upon touching the smaller one, both were instantly drawn in.

In examining the shell while in the wood, there appeared to be a small portion, nearly at right angles to the cylinder, sufficient only to give a passage to the two small tubes. The shell was found, when analysed by Mr. Hatchett, to be perfectly similar to that of the *Teredo gigantea*.

The largest of these worms was 8 inches in length; many of them lived 24 hours after separation from the shell; in these the heart was distinctly seen to palpitate. The blood in the vessels going to the head, and also in the parts near the liver, was of a red colour; but this colour disappeared soon after death.

From the middle of the exposed part of the head proceeds a kind of proboscis. As this has no orifice in it, Mr. Home thinks it probable that it adheres to the wood, and acts as a centre-bit, while the animal works with the boring shells, between which it is situated. The mouth is nearly concealed by the projection of this proboscis. The body of the animal terminates in a small double fold, forming a cup, on the inside of which are two opercula, which, when brought together, close up the shell: these opercula do not correspond to the tubes, but are in a contrary direction. In the *Teredo gigantea* the opercula are situated in a similar manner, each shutting up one half of the bifurcation.

Some other observations, which our limits oblige us to omit, are made on these animals before Mr. Home proceeds to describe their internal structure as observed in the dissection. Here also we must content ourselves with mentioning the most striking circumstances, referring those who wish for more particular information to the paper itself.

Into the cavity of the worm there are two natural openings; one of these is the larger tube already described, by which it receives water from the sea; the other is an aperture under the boring shells, forming a slit in a transverse direction, which opens into the space before the boring shells.

The breathing organs are attached on the posterior surface of this cavity, and have their fringed edges loose, and exposed to the sea water, which passes through this cavity to the head of the animal. In the worms, which were examined while alive, the stomachs, which extend the whole length of the abdomen, were quite empty; but in the stomachs of some of the preserved specimens there was found a yellow-coloured pulp, which, from some experiments made on it by Mr. Hatchett, appeared to be an impalpable vegetable saw-dust. The intestine, after various inflections, terminates in the small tube, through which it empties its contents into the sea.

The heart consists of two auricles, which open into two tubes; these uniting, form the ventricle. The circulation is, of course, single; but the mode in which it is performed seems to be peculiar to this animal; the blood being thrown out from the heart, towards the viscera and the head, and carried afterwards through the ves-

sels of the breathing organs, from which it returns directly to the heart.

The mode in which the breathing organs of this animal are supplied with water, makes it evident, in Mr. Home's opinion, that all similar animals which have no cavity for the reception of sea water, must have their breathing organs placed externally; and he thinks that the beautiful membranous expansions displayed by those species of Actiniæ, called in the West Indies animal flowers, are, in fact, the breathing organs of those animals; and not, as their appearance formerly led Mr. Home to believe, tentacula for catching food.

The *Teredo gigantea*, when arrived at its full growth, closes up its shell; so also does the *Teredo Navalis*. Hence Sellius was led to suppose that the animal, by this act, formed its own tomb. This, however, is not the case; since, in some specimens in Mr. Griffiths's possession, the animal appears to have receded from its first inclosure, and to have formed a second, three inches up the tube, and afterwards a third, two inches further on. These facts show that the *Teredo gigantea*, when arrived at its full growth, closes up its shell, and lives a long time afterwards, being furnished with food from the sea by means of its tentacula. The *Teredo Navalis* closes up its shell in the same manner; it must therefore, after that period, be supplied with food through the medium of the sea water; and it is probable that the small tentacula, before described, are for the purpose of catching food.

As the *Teredo gigantea* bores in mud, from which it cannot be supposed to receive any part of its nutriment, it may be questioned whether the *Teredo Navalis* receives its support from the wood it destroys, or is wholly supplied with food from the sea. The latter opinion appears to Mr. Home the most probable. The quantity of wood taken into its stomach is, he thinks, by no means sufficient for the support of an animal which has red blood and very perfect organs. He also remarks, that the saw-dust already spoken of did not appear to Mr. Hatchett to have undergone any change.

These animals, having only a slight connexion with their shell at one particular spot, are capable of turning themselves round in their shell; this facility of motion seems evidently to be intended for the purpose of boring.

*On the inverted Action of the alburnous Vessels of Trees.* By Thomas Andrew Knight, Esq. F.R.S. In a Letter to the Right Hon. Sir Joseph Banks, K.B. P.R.S. Read May 15, 1806. [*Phil. Trans.* 1806, p. 293.]

Mr. Knight, in the papers formerly communicated by him to the Royal Society, endeavoured to prove that the fluid by which the various parts added to trees, &c. are generated, has previously circulated through their leaves, either in the same or in the preceding season, and has subsequently descended through their barks. There is, however, a circumstance stated by Hales and by Du Hamel, which